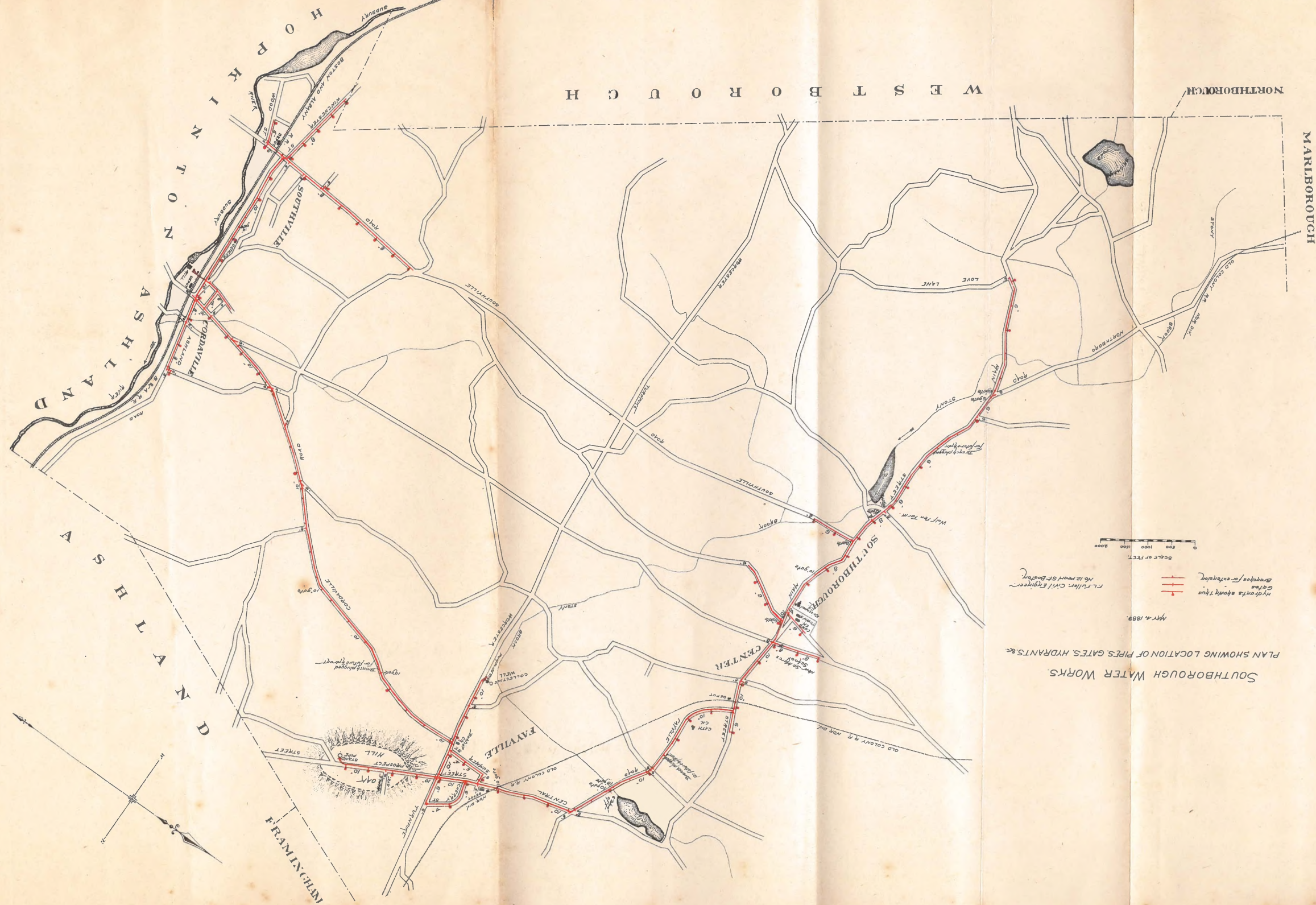


REPORT  
— OF —  
COMMITTEE ON WATER SUPPLY  
— OF THE —  
TOWN OF  
SOUTHBOROUGH.

—  
FEBRUARY, 1890.  
—

FROM THE PRESS OF O. R. YOUNG,  
SOUTHBOROUGH, MASS.  
1890.





SOUTHBOROUGH WATER WORKS  
PLAN SHOWING LOCATION OF PIPES, GATES, HYDRANTS, &c.  
MAY 4, 1889.  
Hydrants shown thus  
Gates or extensions  
R.L. Fuller, Civil Engineer  
No. 12 South St. Boston.

MARLBOROUGH

NORTHBOROUGH

W E S T B O R O U G H

H O P K I N T O N

ASHLAND

FRAMINGHAM

FRAMINGHAM

REPORT OF  
Committee\*on\*Water\*Supply  
OF THE  
TOWN OF SOUTHBOROUGH.  

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FEBRUARY, 1890.  

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TO THE INHABITANTS  
OF THE  
TOWN \* OF \* SOUTHBOROUGH.

The undersigned, a committee appointed at a legal meeting of the Town in pursuance of the votes of which copies are given below, respectfully submit the following report:

VOTES OF THE TOWN FROM THE TOWN RECORDS.

At a legal meeting of the inhabitants of the Town of Southborough, held March 20th, 1888, it was voted, under Article 20, in the warrant: "That a committee of five be appointed to investigate and report at a future meeting, in relation to the introduction of water into the town, and that the expense be paid from the Town Treasury. The chairman appointed A. D. Howe, Adoniram J. Newton, Dr. J. H. Robinson, R. M. Burnett. The meeting then voted that Dexter Newton be one of that committee."



At a legal meeting held March 25th, 1889, under Article 22, it was voted, "To refer the matter back to the water committee, for them to make further investigation, obtain estimates, etc., and report at a future meeting. R. M. Burnett and A. J. Newton declined serving longer on the committee; the meeting then chose C. F. Choate and Francis Wright to fill the vacancies." "Voted to increase the number of this committee by the addition of two more; chose Rev. J. F. Redican and Timothy C. Shea."

It being evident that it was the purpose of the town to obtain as exact information as possible in regard to the most suitable source of supply, and the probable cost of construction of water works, both for the whole town and for the several villages, the committee have employed Mr. Frank L. Fuller, of Boston, a competent engineer of experience in such works, to make examinations under their direction, and to prepare estimates of the cost of the works, and his report, or so much thereof as is pertinent, is given in this report.

There were three sources of supply that had before been mentioned, to which the committee have chiefly given their attention.

1st. To connect with the water system of Northborough, which has a system of water works, with a possible supply much larger than is needed for its own purposes, and from which it was supposed the supply of Southborough could be made by gravitation.

2nd. The springs and brooks on the farm of Joseph Marshall.

3rd. The underground water in the gravel beds of Stony Brook.

To obtain the supply from either of the last two sources, a pumping station and a reservoir or stand pipe would be required.

The committee early abandoned all thought of obtaining a supply from Northborough. By running a line of levels it

was found that the height of the Northborough reservoir was not sufficient to supply the town of Southborough, after making allowance for friction in the pipes, without building a compensating reservoir upon some high point of land in the town of Southborough. The cost of a main pipe to any part of Northborough where connection could be made with a ten inch pipe, a distance from Mr. Choate's corner of 27,000 feet, would not be less than \$42,000, and examination showed that the water of the Northborough reservoir was somewhat colored with vegetable matter, and was not so acceptable for table and drinking purposes as a ground or spring water that could be found within the limits of the town.

The water of the Marshall springs was found to be of excellent quality, and in considerable quantity. At the point where the brook crosses the Westborough road the flow was estimated to be on May 3d, about 142,000 gallons in twenty-four hours, and, on Sept. 6th, about 89,000 gallons. Last season was a wet one and the rainfall above the average. The water shed of these springs is quite small, and it is difficult to judge the dry weather supply.

It was suggested that a reinforcement of this supply might be obtained from a collecting well sunk near Brigham pond. The water of this pond is not satisfactory.

Estimates of the cost of a supply from this source were made, which were read at a special meeting, held May 8th, 1889. The cost of the works by these estimates was, for Fayville and Southborough, \$72,910.09, with an addition for extending the works to Southville and Cordaville, of \$34,064.08, making an aggregate of \$106,974.17, without any allowance for land or water taken. This estimate might probably be reduced by a reduction in the size of pipes and of the reservoir, and by decreasing the extent of distributing pipes perhaps ten per cent. Some doubt was afterwards expressed by the Engineer as to the sufficiency of the supply, and it will be seen that the report of the Board of Health is decidedly against this source of supply as deficient in quantity.

The third source of supply, viz. : the ground waters in the valley of Stony Brook, is the one which the Engineer employed by the committee, recommends as the best and most economical source, and in order to give the fullest information to the town, that part of his report is appended in full.

A GROUND SOURCE FROM A POINT NEAR STONY BROOK,  
NEAR THE WORCESTER TURNPIKE, FAYVILLE.

"Probably the best and most economical source for a water supply for the town would be a collecting well near Stony Brook, not far from the Worcester Turnpike at Fayville.

The water shed above this point is large, and if the soil in the immediate neighborhood is coarse and gravelly, no doubt a large amount of most excellent ground or spring water would be obtained. The source of all our water supplies is the rainfall. This is either taken up by the ground, and flows through it, through pervious strata, to lower and lower levels, following down the hillsides, on its way to the streams in the valley below, or, if the surface be ledgy or rocky, and so impervious to water, directly into the streams. The ground water may also run parallel to the streams if the ground be open and porous, for long distances before entering them.

This water falling from the clouds and filtered through long distances perhaps, of clean gravel and sand, is peculiarly adapted to domestic use. It is clear, cold and colorless and uncontaminated. Pond and brook waters, although also originally from the rainfall, soon absorb more or less color from the vegetable substances with which they come in contact. Exposure in shallow depths on muddy bottoms to the summer sun gives them a peaty or pindy taste, which in addition to the color, renders them undesirable when the spring water can be obtained.

Many of the towns of the State have taken these ground water supplies, and almost without exception they are satis-

factory, especially when stored in a covered reservoir or tank.

#### SOURCES RECOMMENDED.

As will be seen by the plan, it is proposed to locate the pumping station near the Stony Brook, not far from the Worcester Turnpike at Fayville. From the pumping station a twelve inch pipe would be laid on the Turnpike to Prospect street, and thence in Prospect street to a wrought iron tank or stand pipe, 25 feet in diameter, and 80 feet high, located on the high ground at the summit of Oak Hill. The twelve inch pipe extends northerly in Central street from the Worcester Turnpike to the Fayville Road, thence by the Fayville Road, by the Catholic Church to Main street, thence in Main street by the Southborough R. R. Station as far as the Town Hall. Here the main would be reduced to ten inches, and continue of this size to Mr. Burnett's corner. From this point to Love Lane the pipe would be eight inches.

From the Worcester Turnpike, opposite the Baptist Church, Fayville, extends a ten-inch pipe by the Cordaville Road 11,045 feet to Cordaville. From the intersection of Cordaville Road and the street parallel to the Boston and Albany Railroad this ten-inch pipe extends by the latter street, by the Catholic Church, 3,550 feet to Southville near the Boston and Albany Railroad Station. This latter pipe connects the villages of Cordaville and Southville. On the Southville road, from Southville to Mr. Clifford's house, is 3,500 feet of eight-inch pipe. On Winchester street is 2,000 feet of eight-inch pipe. On Ashland Road, from Cordaville toward Ashland, is 1,525 feet of eight-inch pipe.

For various other shorter streets of the town, pipes of the size shown on the plan (and provided for in the estimates) are proposed. Their length is given in the estimate of piping. Branches, for future extension, are to be put in at all required points. Also branches where future hydrants are likely to be needed. An ample number of gates of the vari-

ous sizes have been provided, so that, when required, certain sections of the town can be shut off.

The size of the pipe is believed to be ample, not only for the present but for many years to come. Too often a false economy prompts the laying of long lines of small pipe, which, as the town grows, are likely to fail to supply the water needed in case of a fire of any magnitude, or perhaps even to supply water for domestic service under good pressure. Cast iron pipe is recommended as being by far the best material for water pipes. The price at present is low. The pipes, as now made and coated with asphalt varnish, will last many years without the least deterioration.

Annexed are estimates of cost and a table of elevations and pressures.

The surveys necessary for planning the proposed system were begun early in April of this year, and the plans and profiles soon after. Since the completion of the field work much time and thought has been given to the question, that the best and most satisfactory system might be adopted. The one herein outlined I am sure would be a success and a benefit to the town."

(Signed)

FRANK L. FULLER, *Engineer.*

This plan includes the sinking of a large well near the Worcester Turnpike, with a pumping station, by which the water will be forced to an iron standpipe or reservoir near the top of Oak Hill, and from thence distributed by iron pipes through the town.

The first estimate of the cost of these works, as shown in the annexed statement No. 1, was, for Fayville and Southborough, \$71,158.35, with a further sum of \$32,140.09 to be added if the works are extended to Cordaville and Southville, making the aggregate cost for the whole town \$103,298.44, without any allowance for land taken for the well, pumping station and reservoir.

The committee, thinking this cost too high, requested Mr.



Fuller to make a new estimate, reducing to some extent the size of the pipes and reservoir and the length of the distributing pipes. The result is the statement annexed, No. 2. The difference can be readily seen by comparing them and the way in which the reduction in cost is obtained. The cost of the works by this last estimate is, for Fayville and Southborough, \$56,331.57, with an addition for Cordaville and Southville of about \$32,000, without allowance for land, etc.

While, if it could be afforded, the works built upon the first and larger estimate would be the best, the committee are of opinion that the smaller expenditure would give a copious supply for many years to come. If it should be decided to extend the works to Cordaville and Southville, the supply of water would be sufficient.

The committee have had an examination made of the proposed site for the well and pumping station by sinking pipes under the direction of Mr. Fuller, and are advised by him that there can be no doubt of the adequacy of the supply at this place. If it is thought best, in compliance with the suggestion of the Board of Health, to make further examination, it can easily be done. It may be stated that, at the time when the Engineer of the Board of Health visited and examined the proposed site, the meadow was flooded, and several of the pipes which had been sunk were inaccessible. There should be added to either estimate the cost of the land. If the Engineer's estimates are to be relied on, and the committee think they are, the cost of the cheapest system, including land, for supplying water to Fayville and Southborough would be about

\$60,000

The annual interest on this cost, at four per cent., would be

\$2,400

The cost of running the works, judging from the expenditures of other towns on similar works, would be

\$1,800

The legislation of the State in regard to water has always required the establishment of a sinking fund that would pay the debt in thirty years. This would require each year about	\$1,070
Annual expense for Fayville and Southborough,	\$5,270
The extension to Cordaville and Southville would add to this the annual interest on \$32,000,	\$1,280
And to the amount required for sinking fund,	535 1,815
Total amount expended for whole town,	\$7,085

How large a part of this would be repaid by water rates the committee can form no reliable estimate.

Some suggestions having been made that a cheaper form of pumping engine could be had by using windmills, the committee communicated with a prominent firm and received the reply annexed: The cost of machinery for elevating the water and providing the reservoir with two wells and two wind engines is here \$14,700 against the cost given for steam power by Mr. Fuller in his lowest estimate, \$19,300, and there would probably be some saving in the expense of running the works. The cost of distributing pipes of the same length and capacity would be the same. The committee could learn of no town similar to Southborough supplied in this way, and did not consider the slight saving in building or running would warrant its adoption.

The committee, believing that the object of the town in their appointment is answered in furnishing information, make no recommendation. The advantage to be derived from an abundant supply of good water is too obvious to need repetition here. The question of cost is one for the town to consider. It cannot be expected that any system

that can be adopted will carry water to every house or every farm in the town. Some advantage would come to every inhabitant of the town if the central portion and the manufacturing villages were rendered more attractive for residence, and better sites for business by a full supply of good water.

The reply of the Board of Health, a useful table of heights and pressures prepared by Mr. Fuller, and a statement of the expenses of the committee, are hereto appended.

SOUTHBORO, February 17, 1890.

C. F. CHOATE,  
FRANCIS WRIGHT,  
JOHN F. REDICAN,  
J. HENRY ROBINSON,  
DEXTER NEWTON,  
TIMOTHY C. SHEA,  
A. D. HOWE.

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EXPENSES OF COMMITTEE.

Paid F. L. Fuller, services as engineer,	\$375 00
Smith & Winchester, test wells,	127 56
For printing report and map,	54 00
For sundries,	20 50
	<hr/>
	\$577 06

## Commonwealth of Massachusetts.

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Reply of the State Board of Health to an application from Southborough, for advice in relation to water supply, under the provisions of Chapter 375 of the Acts of 1888.

OFFICE OF STATE BOARD OF HEALTH, }  
13 Beacon Street. }

BOSTON, January 7, 1890.

*To the Committee on Water Supply, Southborough, Mass.*

GENTLEMEN:—The State Board of Health has considered your application, dated Dec. 4, 1889, for advice in regard to the most appropriate source of water supply for Southborough and herewith presents its reply:

The sample of water from the driven test well between the Worcester Turnpike and Stony Brook, west of Fayville, was of satisfactory quality. As regards quantity it is not improbable that a sufficient supply of water might be obtained from a large well at this place; but the indications are not such as to prevent some uncertainty as to the result. The Board therefore advises that further examinations be made before works are constructed to ascertain if some suitable place for a well cannot be found near some other portion of Stony Brook where the underlying material is coarse sand or gravel over a larger area.

It is not probable that Marshall's spring and brook will furnish a sufficient quantity of water.

Per order of the Board,

SAMUEL W. ABBOTT,

*Secretary.*



*A. D. Howe, C. F. Choate, Dexter Newton, J. H. Robinson and others, committee :*

GENTLEMEN:—As per the request of your committee at your meeting of September 19, asking us to submit you an estimate for a windmill pumping plant to supply the villages of Southboro and Fayville with water, we hereby hand you an approximate estimate of what, in our opinion, the expense would be for a standpipe with a capacity of 400,000 to 450,000 gallons, a wind engine of thirty feet diameter placed on a tower seventy-five feet high, a suitable pump for the same, also an artesian well of eight or ten-inch bore 100 feet deep.

In case it was necessary to use small pipe wells instead of a large size artesian well, the cost would not exceed that which we have stated for the larger well. These figures possibly can be reduced according to the location and circumstances. The exact cost could not be ascertained without first knowing the exact location of the tank, the mill and source of water supply.

In giving the matter considerable thought since we were present at your meeting, we have concluded that probably the most satisfactory supply would be obtained by placing one large standpipe at such point as would furnish both the villages above mentioned, thus doing away with the cost of a second standpipe in case a separate supply for the two villages was entertained.

We would also suggest that, in our opinion, it would be economy and a safeguard to put in two wheels, both pumping into the same main pipe leading to the standpipe, and in case it was necessary to use the full power of the two wheels it could be done, and in case a single wheel would supply the two villages with water during the wintry portion of the year, the second wheel could remain at rest.

Then, again, should one of these wheels become at all disabled from any cause whatever, the second wheel could be called upon to do its work. In this case the additional expense of a windmill, tower and pump would amount to

about \$1,800. The additional cost of another artesian well, in case water was taken from these wells instead of driven pipes, would amount to from \$1,000 to \$1,500.

In regard to the location of a water supply to furnish the two villages from one stand pipe, we presume your committee can easily locate some point where the elevation, in case the water was taken from the driven pipes would not exceed 100 feet. It is generally understood that the higher a wind engine is in the air, the freer current of wind it receives, and consequently its work is more effective. With the above remarks in regard to the wind engines we submit the following estimate:

For each 30 foot wheel set up and connected	
with suitable pump, . . . . .	\$1,800 00
Each Artesian well, . . . . .	1,200 00
Dry well for placing pump below frost and	
bricking same, . . . . .	100 00
Stand pipe holding upwards of 400,000 gals.	7,400 00
Foundation for stand pipe, . . . . .	1,000 00
The necessary valves and fittings to make	
the job complete, . . . . .	200 00

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\$11,700 00

We would here state that the stand pipe is to be complete in every respect, including ladder on both inside and out, man hole in the shell near the bottom, and painted inside and out with two coats of mineral paint.

The above estimates would make the entire pumping plant complete in every respect, with the exception of the necessary pipe to connect the pump with the stand pipe, which cannot be reckoned on until the location of the two are definitely known.

In regard to the ability of these two wheels for furnishing the town with water, we have not the slightest doubt but what they would furnish an abundant supply of water for

twice the number of inhabitants that now live in the two villages.

We should be very glad to meet your committee at any time they may wish, and give them any further information in regard to this, or would be pleased to give them, by correspondence, any figures they may require as to the capacity of the pumps, mills, or in fact any information they may require in connection with this estimate.

Trusting the above figures will enable you to compare the advantages of wind favorably with that of other power, and awaiting your further commands, we remain

Yours truly,

SMITH & WINCHESTER.

# SOUTHBOROUGH WATER WORKS.

## ESTIMATE No. 1.

### Southborough Centre and Fayville.

#### ESTIMATE OF PIPE.

STREET.	FROM.	TO	12 in	10 in	8 in	6 in	4 in
Main st.	Love lane	Rd.east Wolf Pen farm office			5,820		
Main st.	Rd.east Wolf Pen farm office	Street east of Cong. church		2,920			
Main st.	Street east of Cong. church	Fayville road	2,430				
Fayville road	Main st.	Central st.	4,230				
Central st.	Fayville road	Worcester turnpike	3,000				
Prospect st.	Worcester turnpike	Stand pipe	2,150				
Street east of Cong. church	Main st.	Northerly			500		
Middle Southville road	Main st.	Toward Southville			1,290		
Main st.	Fayville road	Easterly			450		
Southville road	Main st.	Toward Southville			1,000		
Rd.west of St. Mark's school	Main st.	New Saint Mark's school			1,000		
Cherry st.	Central st.	Worcester turnpike				1,160	
Summer st.	Central st.	Worcester turnpike				1,070	
Worcester turnpike	Pumping station	Prospect st.	2,300				
Worcester turnpike	Central st.	Cherry st.			600		
Hydrant branches						400	
			14,110	2,920	10,660	2,630	



14,110	lineal feet 12 in. pipe, 80 lbs. per foot,	1,128,800	lbs.
2,920	" " 10 " " 65 " "	189,800	"
10,660	" " 8 " " 45 " "	479,700	"
2,630	" " 6 " " 30 " "	78,900	"

30,320	" "	1,877,200	"
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5.74 miles.

838.03 tons of 2,240 lbs.

838.03 tons at \$30.50,

\$25,559.91

## PIPE LAYING.

14,110	lineal feet 12 in. pipe, 0.40 per foot,	\$5,644	00
2,920	" " 10 " " 0.35 " "	1,022	00
10,660	" " 8 " " 0.30 " "	3,198	00
2,630	" " 6 " " 0.25 " "	657	50
			<hr/> \$10,521 50

Pipe and Pipe Laying,	\$36,081 41
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Collecting well near Stony Brook, Fayville,	\$5,000 00
Brick pumping station,	5,000 00
Pumping plant,	5,500 00
Stand Pipe, 25x80, including foundations,	9,000 00
Special castings,	675 00
Forty-seven hydrants at \$27.00 each,	1,269 00
Gates and gate boxes,	1,164 00
Rock excavation,	1,000 00

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\$64,689 41

Add ten per cent. for engineering and contingencies, 6,468 94

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\$71,158 35

Pipe and pipe laying for Southville and Cordaville, as given below,	32,140 09
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Total for whole Town of Southborough,	\$103,298 44
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## Southville and Cordaville.      Estimate of Pipe.

STREET.	FROM.	TO.	12 in.	10 in.	8 in.	6 in.	4 in.
Cordaville road	Wor. turnpike, Fayville	Southville road, Cordaville		11,045			
Street parallel B. & A. R.R.	Cordaville	Southville		3,550			
Southville road	Rd. to Cordaville, Southville	Clifford's house			3,500		
Southville road	Rd. to Cordaville, Southville	Wood st.				370	
Winchester street	Southville road	Summit of hill			2,000		
Wood street	Southville road	Westerly				450	
Ashland road	Cordaville	Toward Ashland			1,525		
St. south Catholic parson'ge	Cordaville road	Westerly					415
St. west of Cordaville Sta.	Cordaville mills	Northerly to last house			400	800	
Hydrant branches						280	
				14,595	7,425	1,900	415

14,595 lineal feet 10 inch pipe at 65 lbs. per foot,	948,675 lbs.
7,425 " " 8 " " " 45 " " "	334,125 "
1,900 " " 6 " " " 30 " " "	57,000 "
415 " " 4 " " " 20 " " "	8,300 "
<hr/> 24,335	<hr/> 1,348,100 lbs.
4.61 miles	601.83 tons of 2,240 lbs.
601.83 tons at \$30.50	\$18,355.81

## PIPE LAYING.

14,595 lineal feet 10 in. pipe, 0.35 per foot,	\$5,108 25
7,425 " " 8 " " 0.30 "	2,227 50
1,900 " " 6 " " 0.25 "	475 00
415 " " 4 " " 0.20 "	83 00
	<hr/> \$ 7,893 75
Pipe and Pipe Laying,	<hr/> \$26,249 56
Special castings,	450 00
Thirty-two hydrants at \$27.00 each,	864 00
Gates and gate boxes,	654 70
Rock excavation,	1,000 00
	<hr/> \$29,218 26
Add ten per cent. for engineering and contingencies,	2,921 83
	<hr/> \$32,140 09

# SOUTHBOROUGH WATER WORKS.

## ESTIMATE No. 2.

### Southborough Centre and Fayville.

#### ESTIMATE OF PIPE.

STREET.	FROM.	TO	10 in	8 in	6 in	4 in
Main st.	Love lane	Rd.eastWolf Pen farm office			5,820	
Main st.	Rd.eastWolf Pen farm office	Street east of Cong. church		2,920		
Main st.	Street east of Cong. church	Fayville road	2,430			
Fayville road	Main st.	Central st.	4,230			
Central st.	Fayville road	Worcester turnpike	3,000			
Prospect st.	Worcester turnpike	Stand pipe	2,150			
Street east of Cong. church	Main st.	Northerly			500	
Middle Southville road	Main st.	Toward Southville			1,290	
Main st.	Fayville road	Easterly			450	
Southville road	Main st.	Toward Southville			1,000	
Rd.west of St. Mark's school	Main st.	New Saint Mark's school			1,000	
Cherry st.	Central st.	Worcester turnpike			500	650
Summer st.	Central st.	Worcester turnpike			500	570
Worcester turnpike	Pumping station	Prospect st.	2,950			
Worcester turnpike	Central st.	Cherry st.			600	
Hydrant branches					400	
			14,760	2,920	12,060	1,220



14,760 lineal feet 10 in. pipe at 65 lbs. per foot,	959,400 lbs.
2,920 " " 8 " " 45 " "	131,400 "
12,060 " " 6 " " 30 " "	361,800 "
1,220 " " 4 " " 20 " "	24,400 "
30,960 " = 5.86 miles.	
959,400 lbs.	
131,400 "	
361,800 "	
1,452,600 lbs. = 648.5 tons at \$29.81	\$19,331.79
24,400 " = 10.9 " 30.81	335.83
	<u>\$19,667.62</u>

## PIPE LAYING.

14,760 lineal feet 10 in. pipe at 0.32	\$4,723.20
2,920 " 8 " " 0.28	817.60
12,060 " 6 " " 0.24	2,894.40
1,230 " 4 " " 0.20	246.00
	<u>\$8,681.20</u>
	\$28,348.82

## PIPE AND PIPE LAYING.

Collecting well near Fayville,	\$4,500.00
Brick pumping station and engine foundations,	4,300.00
Pumping engine, boiler, suction pipe, etc.	5,500.00
Stand pipe 20 ft. by 80 ft., including foundation,	5,000.00
Special castings,	550.00
Forty-seven hydrants at \$24,	1,128.00
Gates and gate boxes,	883.70
Rock excavation,	1,000.00
	<u>\$51,210.52</u>
Add 10 per cent. for engineering and contingencies,	\$ 5,121.05
Total for Southborough Center and Fayville,	<u>\$56,331.57</u>

F. L. FULLER, *Civil Engineer.*

October 28, 1889. 12 Pearl Street, Boston.

## TABLE OF ELEVATIONS.—(ABOVE SEA LEVEL.)

Also head in feet and pressure per square inch, due to high water in proposed stand pipe on Oak Hill.

	Elevation.	Head in ft.	Pressure in lbs. per sq. inch.
Top of iron tank, or stand pipe, 80 feet high, summit of Oak Hill.....	499.	0.	0.
Summit of Marshall's Hill.....	440	59.	26.
Intersection of Main st. and road to Northborough,	278.	221.	96.
Top of granite post, 300 feet west of Charles F. Choate's barn.....	301.	198.	86.
Top of stone post opposite Mr. Buck's house,....	302.	197.	85.
Top of post opposite Mr. Sears' barn.....	284.	215.	93.
Step of Wolf Pen farm office.....	285.	214.	93.
Top of underpinning of Joseph Burnett's house, abt	267.	223.	97.
Intersection of Main st. and Southville road.....	270.	229.	99.
Step of Robert Burnett's house.....	281.	218.	94.
Lower stone step of Town Hall.....	336.	163.	71.
Top of underpinning, Dexter Newton's house.....	293.	206.	89.
Old Colony R. R. track at Southborough Crossing..	303.	196.	85.
Top of underpinning of Cath. church, Southborough	331.	168.	73.
Old Colony R. R. track at Fayville Crossing.....	276.	223.	97.
Lowest point in road to Fayville, at Stony Brook.,	241.	258.	111.
Intersection of Prospect st. and Wor. turnpike....	316.	183.	79.
Summit of Oak Hill, Fayville.....	419.	80.	34.
Boston & Albany R. R. track at Southville.....	267.	232.	100.
Top of Webster's hill, Southborough, rear of blacksmith's shop.....	352.	147.	63.
Top of brick underpinning, Cath. ch., Cordaville...	298.	201.	87.
Door sill of lockup, Cordaville.....	263.	236.	102.
Boston & Albany R. R. track at Cordaville.....	253.	245.	107.
Summit of hill, Winchester st., Southville.....	308.	191.	83.
Summit of Rock Hill, Northborough road.....	351.	148.	60.
Old Colony R. R. tracks as Northborough.....	304.	195.	84.
Lower step of Milo Hildreth's office, Northborough	272.	227.	98.
High water in Brigham's pond.....	319.	180.	78.
Surface of water, Northborough reservoir.....	449.	50.	22.
Top of spire, Cong. church, Southborough, abt....	462.	37.	16.
Top of spire, Cath. church. Southborough, abt....	402.	97.	42.